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# **Effect Incorporation of Corn Cob Powder on the Physicochemical** Properties and Sensory Acceptability of Kuih Kaswi

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#### HISTORY

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**KEYWORDS** 

Traditional Malay kuih Kuih Kaswi Nutrient-balanced diet Fibre Organic ingredients

## **INTRODUCTION**

ABSTRACT

This study's objective is to investigate the effect of incorporating corn cob powder (CCP) on the physicochemical and sensory acceptability of kuih kaswi. Kuih kaswi was prepared in formulations (control A 0% CCP (corn cob powder): 100% WF (wheat flour), B 5% CCP (corn cob powder): 95% WF, C 10% CCP: 90% WF, D 15% CCP: 85% WF, E 20% CCP: 80% WF and F 25% CCP: 75% WF). Results shows that the pH of kuih kaswi ranges from 7.08 to 7.35. The colour profile L\* values range from 23.75 to 25.60, a\* values range from 4.96 to 5.23 and  $b^*$  values range from 6.15 to 6.53. The texture profile also shows significant changes, but the sensory evaluation result shows the acceptability of panels towards the addition of CCP in kuih kaswi. As a result, this research successfully managed to improve the physicochemical properties and fibre in kuih kaswi with the incorporation of CCP.

Traditionally served topped or covered with freshly grated coconut, Kuih kaswi is a steamed Malaysian dessert made with a mixture of wheat and tapioca flour, alkaline lime water, and dark palm sugar (which gives these confections their main characteristic of dark-brown color). Modern varieties of kuih kaswi are often flavoured with pandan leaves, which give them an appealing, vibrant green colour [1]. However, not much research has been done on the physiochemical properties of traditional local foods, particularly malay kuih like kuih kaswi.

Corn cob is the main residue of corn, and it contains a high amount of fibre that can be used to supply the amount of fibre the consumer needs. According to Tarrés et al. [2], industrial residues are frequently burned, dumped, and recycled. Therefore, it has negative effects on the environment, and many researchers have begun to focus on using these plentiful and affordable industrial residues as sustainable materials. If the corn cob is used as functional food, these measures can decrease the number of waste and pollution coming from these groups. Therefore, the objective of this study was to evaluate the effect of the addition of corn cob powder on the physicochemical properties and sensory acceptance of kuih kaswi.

### MATERIALS AND METHODS

There were five formulations of kuih kaswi incorporated with CCP (corn cob powder) and one control (without CCP). Sample A (control) is 100% WF (wheat flour), Sample B is 5% CCP and 95% WF, Sample C is 10% CCP and 90% WF, Sample D is 15% CCP and 85% WF, Sample E is 20% CCP and 80% WF, Sample F is 25% CCP and 75% WF. All experiments were in triplicate. The corn cob was dried to moisture content was 8% w/w and ground to a particle size of <0.250 mm.

To determine the pH value and crude fibre of each sample, a pH meter and FibreBag were used based on the standard AOAC [3] method. Texture profile analysis was carried out using a TA-XT2 Texture Analyser (Stable Micro System Ltd., UK). Sensory evaluation was carried out using 35 semi-trained panels among Universiti Malaysia Terengganu undergraduate students. Oneway ANOVA with a 95% confidence interval was used to analyse data. Mean differences were tested to compare all the results of different treatments (B, C, D, E and F) and controls (A).

### **RESULT AND DISCUSSION**

**Table 1** shows the results and the impact of CCP incorporation on the physicochemical properties and sensory acceptance of *kuih kaswi*. The pH value of *kuih kaswi* incorporated with different percentages of CCP ranges from 7.08 to 7.35, which indicates lower pH values with the increasing of amount CCP. Meanwhile, the colour profile showed a decreasing value of lightness (L\*) and yellowness (b\*), with increasing use of CCP. However, the\* values showed a decreasing trend toward more redness. The texture profile attributes of hardness and cohesiveness are increased significantly by the incorporation of CCP. Meanwhile, adhesiveness, springiness, and chewiness are significantly lower with the addition of more CCP in the *kuih kaswi*. The overall result of sensory shows not much difference, and panel members preferred *kuih kaswi* with the incorporation of more CCP which can go up 25% (Sample F). The results also show an increasing trend of crude fiber content as increasing CCP. Because CCP has a high fibre content, it can be used to boost the fibre content of bakery goods like bread [4]. The present study's results were consistent with a few other studies that showed adding fiber-rich ingredients, like matured green banana flour and oat  $\beta$ -glucan [5], orange bagasse product [6], mango peels [7], and soybean flour [8], would raise the amount of fibre in the food products under investigation.

**Table 1**. Results of pH value, colour profile analysis, texture profile analysis and sensory properties of *kuih kaswi* incorporated with CCP. Sample A (control): 100% WF; Sample B: 5% CCP and 95% WF; Sample C: 10% CCP and 90% WF; Sample D: 15% CCP and 85% WF; Sample E: 20% CCP and 80% WF; Sample F: 25% CCP and 75% WF. Values are expressed as mean  $\pm$  SD of triplicates measurement. Superscripts with different letters are significantly different at *p*<0.05 in the same row.

Parameters	A(Control)	В	С	D	Е	F
pH value	$7.35\pm0.01^{\rm a}$	$7.31\pm0.01^{\rm a}$	$7.26\pm0.01^{\rm b}$	$7.22\pm0.01^{\rm b}$	$7.16\pm0.03^{\circ}$	$7.08\pm0.02^{\rm d}$
L*	$23.75\pm0.20^{\rm c}$	$23.79\pm0.10^{\circ}$	$24.62\pm0.14^{\text{b}}$	$24.91 \pm 0.09^{b}$	$25.37\pm0.04^{\rm a}$	$25.60\pm0.04^{\rm a}$
a*	$5.23\pm0.03^{\rm a}$	$5.20\pm0.02^{\rm a}$	$5.18\pm0.01^{\rm b}$	$5.12\pm0.02^{\rm b}$	$5.037\pm0.02^{\rm c}$	$4.96\pm0.05^{\rm d}$
b*	$6.15\pm0.05^{\rm d}$	$6.25\pm0.04^{\rm c}$	$6.36\pm0.04^{\text{b}}$	$6.45\pm0.02^{\rm a}$	$6.52\pm0.03^{\mathtt{a}}$	$6.53\pm0.01^{\text{a}}$
Hardness	$308.34\pm1.99^{\rm f}$	$573.87\pm4.11^{\text{e}}$	$610.58\pm2.18^{\rm d}$	$748.68\pm3.80^\circ$	$857.29 \pm 17.22^{\rm b}$	$1003.1 \pm 13.10^{\rm a}$
Adhesiveness	$-31.34\pm5.65^{\mathrm{a}}$	$\textbf{-54.26} \pm 3.57^{ab}$	$-88.27 \pm 1.49^{bc}$	$-93.68 \pm 2.20^{\circ}$	$-121.30 \pm 24.0^{\circ}$	$\text{-}251.30 \pm 18.10^{\text{d}}$
Springiness	$0.92\pm0.01^{\rm a}$	$0.93\pm0.01^{\rm a}$	$0.78\pm0.01^{\rm b}$	$0.70\pm0.01^{\circ}$	$0.64\pm0.03d$	$0.55\pm0.01^{\circ}$
Cohesiveness	$0.54\pm0.01^{\rm d}$	$0.55\pm0.01^{\rm d}$	$0.60\pm0.00^{\rm c}$	$0.69\pm0.01^{\rm b}$	$0.69\pm0.01^{\text{b}}$	$0.78\pm0.01^{\rm a}$
Chewiness	$636.20\pm19.00^{\mathtt{a}}$	$660.30\pm38.90^{\text{a}}$	$596.30\pm44.70^{\mathtt{a}}$	$417.4\pm43.00^{\mathrm{b}}$	$378.4\pm36.50^{b}$	$126.51 \pm 10.85^{\rm c}$
Colour	$5.57 \pm 1.10^{\rm a}$	$5.63 \pm 1.13^{\rm a}$	$5.83\pm0.91^{\rm a}$	$5.80\pm0.85^{\rm a}$	$5.70\pm0.99^{\rm a}$	$5.60 \pm 1.07^{\rm a}$
Odour	$4.30\pm1.44^{\text{b}}$	$4.87\pm1.72^{ab}$	$4.63\pm1.10^{ab}$	$5.07 \pm 1.26^{ab}$	$5.30\pm1.12^{\rm a}$	$4.83 \pm 1.17^{\text{ab}}$
Texture	$3.77\pm1.96^{\rm bc}$	2.67±1.63°	$5.27\pm1.39^{\rm a}$	$4.43 \pm 1.31^{ab}$	$5.23\pm1.27^{\rm a}$	$5.33 \pm 1.30^{\rm a}$
Taste	$5.07\pm1.11^{\rm a}$	$4.70\pm1.37^{\rm a}$	$5.40 \pm 1.00^{\rm a}$	$4.77 \pm 1.48^{\rm a}$	$4.63\pm1.63^{\rm a}$	$4.43\pm1.31^{\rm a}$
Aftertaste	$3.90\pm1.63^{\rm a}$	$3.77\pm1.68^{\rm a}$	$4.17\pm1.34^{\rm a}$	$4.40\pm1.61^{\mathtt{a}}$	$4.53\pm1.50^{\rm a}$	$4.57\pm1.41^{\rm a}$
Overall acceptance	$5.33\pm1.18^{ab}$	$4.53\pm1.22^{\rm b}$	$5.57\pm1.07^{\rm a}$	$5.07\pm1.29^{\rm ab}$	$5.10\pm1.32^{\rm ab}$	$4.63\pm1.43^{ab}$
Crude Fibre Content (%)	$0.88\pm0.19^{\rm f}$	$1.19\pm0.08^{\text{e}}$	$1.35\pm0.07^{\rm d}$	$1.47\pm0.06^{\circ}$	$1.70\pm0.08^{\rm b}$	$1.98\pm0.09^{\rm a}$

#### CONCLUSION

CCP is a by-product of the corn processing industry; its use can provide alternative solutions to environmental concerns regarding disposal; the results show that CCP could be considered as an alternative flour or value-added food ingredient for bakery products, functional foods, and nutraceuticals. The addition of CCP improved the nutritive value of the *kuih kaswi* and resulted in gradually higher fiber content.

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#### REFERENCES

- 1. Kamaruzaman MY, Ab Karim S, Ishak FA, Arshad MM. The diversity of traditional Malay kuih in Malaysia and its potentials. J Ethnic Foods. 2020; 7(1).
- Tarrés Q, Espinosa E, Domínguez-Robles J, Rodríguez A, Mutjé P, Delgado-Aguilar M. The suitability of banana leaf residue as raw material for the production of high lignin content micro/nano fibers: From residue to value-added products, In Crops and Prod. 2017; 99:27-33.

- AOAC (Association of Official Analytical Chemists) International. 2005. Official methods of Analysis of AOAC international,18th Edition. Gaithersburg, MD, USA, Official Method.
- Lee CM, Gan YY, Chan YL, Yap KL, Tang TK, Tan CP, Lai OM. Physicochemical and sensory analyses of high fibre bread incorporated with corncob powder. In Food Res J. 2019; 26(5):1609–1616.
- Chong LC, Abdul Aziz NA. Effects of banana flour and β-glucan on the nutritional and sensory evaluation of noodles. Food Chem. 2010; 119 (1): 34-40.
- Romero-Lopez MR, Osorio-Diaz P, Bello-Perez LA, Tovar J, Bernardino-Nicanor A. Fiber Concentrate from orange (*Citrus* sinensis L.) bagase: Characterization and application as bakery product ingredient. In J Mol Sci. 2011; 12: 2174-2186.
- Ajila CM, Leelavathi K, Prasada Rao UJS. Improvement of dietary fiber content and antioxidant properties in soft dough biscuits with the incorporation of mango peel powder. J Cer Sci. 2008; 48(2): 319-326.
- Ndife J, Abdulraheem LO, Zakari UM. Evaluation of the nutritional and sensory quality of functional breads produced from whole wheat and soya bean flour blends. Afri J Food Sci. 2011; 5(8): 466-472.